A DECIMAL SYSTEM OF WEIGHTS AND MEASURES FOR THE UNITED STATES

REMARKS

OF

HON. MILTON H. WELLING

OF UTAH

IN THE

HOUSE OF REPRESENTATIVES

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"The Congress shall have power * * * to coin money, regulate the value thereof, and of foreign coin, and fix the standard of weights and measures."—Art. I, sec. 8, Constitution of the United States.

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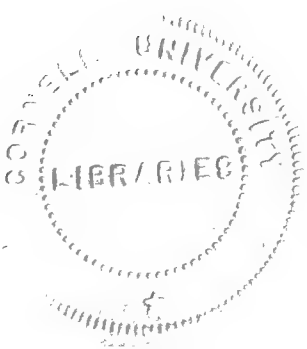
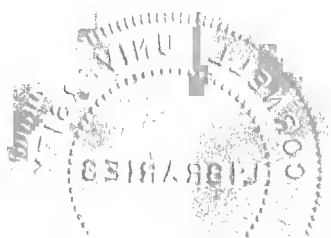
167905—20553





REMARKS

OF

HON. MILTON H. WELLING.

A DECIMAL SYSTEM OF WEIGHTS AND MEASURES FOR THE UNITED STATES.

Mr. WELLING. Mr. Speaker, availing myself of the right to extend my remarks in the RECORD, I submit the bill to establish the standard of the weights, measures, and coins of the United States.

Accompanying the bill is a statement of the details of the legislation and an analysis of the measure prepared by Mr. Samuel Russell, who has given much thought and study to this problem and is an earnest advocate of the proposed reform.

The bill and statement are as follows.

A bill (H. R. 12850) to establish the standard and decimal divisions of the weights, measures, and coins of the United States.

Be it enacted, etc., That the standard of the weights, measures, and coins of the United States, and the decimal divisions thereof, shall, after the 1st day of January, 1921, be as follows:

The standard for the measure of length shall be the foot as heretofore commonly used and established as a measure of length in the United States of America, and which is the standard foot of the United Kingdom of Great Britain and Ireland.

The decimal divisions of the foot shall be the tenth or decimal inch, the hundredth or line, and the thousandth or point, of which 10 points equal 1 line, 10 lines equal 1 decimal inch, and 10 decimal inches equal 1 foot. One hundred points equal 1 decimal inch, and 1,000 points equal 1 foot.

The common fractions of the foot shall be the half, third, quarter, and twelfth, of which the twelfth shall be denominated the common inch.

The common multiples of the foot shall be the yard, the fathom, the rod, the furlong, and the mile, of which the yard equals 3 feet, the fathom equals 6 feet, the rod equals 16½ feet, the furlong equals 40 rods and the mile equals 320 rods.

The standard for the measure of plane surfaces shall be the square of the foot, which shall be designated the square. The decimal division of the square shall be the square of the decimal inch, which shall be designated the decimal square, and of which 100 decimal squares equal 1 square.

The squares of the respective multiples and divisions of the foot may be used for the measurement of plane surfaces.

The standard for the measure of land surfaces shall be the acre of 160 square rods. The square furlong equals 10 acres. The acre-foot is the measure of water, having a surface of 1 acre and a depth of 1 foot

The standard for the measure of volume shall be the cube of the foot, which shall be designated the cube. The decimal division of the cube shall be the cube of the decimal inch, which shall be designated the decimal cube, and of which 1,000 decimal cubes equal 1 cube.

The cubes of the respective multiples and divisions of the foot may be used for the measurement of volume.

The standard for the measurement of weight shall be the weight of the cube of water at maximum density, which shall be designated the weight unit. The decimal unit for the measurement of weight shall be the ounce, which shall be the weight of the decimal cube of water at maximum density. The decimal divisions of the ounce shall be the dram and the grain, of which 10 drams equal 1 ounce, 1,000 grains equal 1 ounce. One hundred grains equal 1 dram.

The multiples of the ounce shall be the decimal pound, the weight unit, the quarter, and the ton, of which 10 ounces equal 1 decimal pound, 100 decimal pounds equal 1 weight unit, 1,000 ounces equal 1 weight unit, 8 weight units equal 1 quarter, 4 quarters equal 1 ton.

Multiples of the decimal pound of 10 ounces may be used for measures of weight.

The avoirdupois or common pound equals 16 ounces; the ton equals 2,000 avoirdupois pounds.

The standard for the measure of liquids shall be the liquid ounce, which is equal to the decimal cube, and of which 10 liquid ounces equal 1 decimal pint, and 1,000 liquid ounces equal 1 liquid cube.

Multiples of the decimal pint of 10 decimal cubes may be used for liquid or dry measure.

The standard for the measure of dry commodities shall be the cube measure, which is the cube of the foot. The common divisions of the cube for dry measure shall be the quart, the pot, the gallon, the peck, and the half cube, of which 2 quarts equal 1 pot, 2 pots equal 1 gallon, 2 gallons equal 1 peck, 2 pecks equal 1 half cube, 2 half cubes equal 1 cube.

The bushel shall be equal to 1,250 decimal cubes. The bushel is equal to 5 pecks, 10 gallons, 20 pots, or 40 quarts.

167905—20553

The water-flow unit shall be the flow of 1 cube of water in one second of time.

The mechanical-power unit shall be the quantity of power required to raise 1 weight unit 1 foot in one second of time.

The thermal unit shall be the quantity of heat required to raise 1 ounce of water 1 degree of the scale of the Fahrenheit thermometer.

The water-pressure unit is the pressure of 1 ounce in weight upon the surface of 1 decimal square.

The steam-pressure unit is the pressure of 1 ounce in weight upon the surface of 1 decimal square.

The Bureau of Standards shall, upon the basis of the standard weights and measures herein established, determine the standards for technical application in the arts and sciences.

The silver coins of the United States shall be the dollar, the 2-franc piece, the franc, and the dime. The weight of the dollar shall be 1 ounce, 900 fine, of silver; the weight of the 2-franc piece shall be 400 grains, or two-fifths of 1 ounce of silver, 800 fine; the weight of the franc shall be 200 grains, or one-fifth of an ounce of silver, 800 fine; and the weight of the dime shall be 100 grains, or one-tenth of an ounce of silver, 800 fine.

The minor coins of the United States shall be the nickel, the penny, and the cent. The weight of the nickel shall be 100 grains of an alloy of three parts of copper and one part of nickel; the weight of the penny shall be 100 grains of an alloy of 95 per cent copper and 5 per cent of tin and zinc; and the weight of the cent shall be 50 grains of an alloy of 95 per cent of copper and 5 per cent of tin and zinc, in such proportions as shall be determined by the Director of the Mint.

The gold coins of the United States shall be the pound, the eagle, and the double eagle. The standard weight of the pound shall be 294.8 grains of gold, 900 fine; the weight of the eagle shall be 589.6 grains of gold, 900 fine; and the weight of the double eagle shall be 1,179.2 grains of gold, 900 fine.

The standard of value shall be the dollar, equivalent to 58.96 grains of gold, 900 fine, or one-fifth of the gold pound.

The coins of the United States shall have the following relative values: 1 cent equals 10 mills, 1 penny equals 2 cents, 1 nickel equals 5 cents, 1 dime equals 10 cents, 1 franc equals 20 cents, 1 franc equals 10 pence, 2 francs equal 40 cents, 1 dollar equals 100 cents, 1 dollar equals 5 francs, 1 pound equals 5 dollars, 1 pound equals 25 francs, 1 eagle equals 10 dollars, 1 eagle equals 2 pounds, 1 eagle equals 50 francs, 1 double eagle equals 20 dollars, 1 double eagle equals 4 pounds, 1 double eagle equals 100 francs.

167905—20553

Congress has never exercised the authority conferred expressly by the Constitution to fix the standard of weights and measures for the United States, although this was regarded as a necessary project at the time of the union of the Colonies. The Articles of Confederation contained a similar provision in regard to a uniform system of weights and measures for the Colonies.

The fact that our common measures, in terms of the foot, the inch, the pound, the ounce, and the ton, have been preferred to the metric system, is because of their great superiority in point of convenience. The meter itself is a very inconvenient and awkward measure. The metric system, moreover, offers no unit between the centimeter of about 4 inches and the meter of about 40 inches; that is to say, it offers no unit of measure that is adapted, in a practical way, to the customary needs of the people. This is demonstrated by the fact that our yard measure, which is even more convenient for our purposes than the meter, has itself gone into relative obsolescence with the extended use of the more convenient foot as the primary unit of mensuration. The height of mountains, the depth of the sea, and the dimensions of all artificial structures are determined by the foot measure.

The clear preference of custom for the foot is not to be ignored. It is not a restricted or provincial view which declares the superiority of the foot over the meter. The fact is that every important country in the world has a similar customary unit. For example, the Roman pes is 11.65 inches, the Danish fod is 1.03 feet, the Swedish fot is 11.69 inches, the Norwegian fot is 12.35 inches. The Russian foute is exactly 12 inches, the Rhine fuss is 1.03 feet, the Viena fuss is 1.037 feet, the Portuguese and the Brazilian pè is 1.08 feet, the French pied is 1.066 feet, the Attic pous is 1.011 feet, the Olympic pous is 1.051 feet, and the Japanese shaku is 0.994 foot. It thus appears that every important country in the world has adapted its customs of trade and mechanics to a measure analogous and almost exactly comparable to our present English foot.

The only virtue in the metric system is the convenience of computation resulting from the decimal notation upon which it is arranged. But even in the matter of decimal notation the metric system goes to such absurd extremes that the decimal multiples of the meter have been ignored and many of its other denominations have gone into disuse. A true decimal system has its advantages and is to be desired. It must be said, however, that the utility of the decimal system is confined to the divisions of the unit or standard. The decimal arrangement has no special utility when dealing with integers or units in any number whatever. Upon this principle we have ignored our eagles and double eagles when counting dollars, and for the same reason dekameters, hektometers, and myriameters are not much used.

The great consideration is to preserve our customary units of measure and weight and to bring the divisions of the same into proper decimal relations. This will afford all the advantages of the decimal features of the metric system and preserve for us the great convenience of our own common measures. Inasmuch as these common measures are practically universal in all countries they offer the only true basis for a real international system.

The desirability of a decimal arrangement was clearly perceived by James Watt, the great English engineer and mechanician. In November, 1783, he proposed the international "philosophical pound" of 10 ounces and the division of the ounce into 1,000 grains. He said, "Let all elastic fluids be measured by the ounce measure of water by which the valuation of different cubic inches will be avoided and the common decimal tables of specific gravities will immediately give the weights of those elastic fluids." The ounce to which Watt referred is the weight of the cube of one-tenth of the foot of water at maximum density. Watt was quick to perceive this decimal relation between the foot and ounce and proposed that the measure of weight be thus derived from the measure of length. Watt expressly stated that the proper plan for an ideal decimal system should retain the foot and the ounce. In a letter to Mr. Magellan he said:

"As to the precise foot or pound, I do not look upon it to be very material, in chemistry at least. Either the common English foot may be adopted according to your proposal, which has the advantage that a cubic foot is exactly 1,000 ounces, consequently the present foot and ounce would be retained; or a pendulum which vibrates 100 times a minute may be adopted for the standard, which would make the foot 14.2 of our present inches, and the cubic foot would be very exactly a bushel and would weigh 101 of the present pounds, so that the present pound would not be much altered. But I think that by this scheme the foot would be too large and that the inconvenience of changing all the foot measures and things depending on them would be much greater than changing all the pounds, bushels, gallons, etc. I therefore give the preference to those plans which retain the foot and the ounce."

There was a great deal of speculation at the end of the eighteenth century with respect to finding some definite measure in the natural world to which our artificial measures might be referred. There is obviously no such unit within the possibility of practical application. The most definite measure we have is that of time made by the diurnal revolution of the earth, which we have divided into 86,400 seconds. The pendulum adjusted to vibrate in seconds has a definite length at a given altitude and latitude. The second pendulum vibrating in a vacuum at London is 39.13908 inches in length. The standard foot has been determined to be $\frac{1}{39.13908}$ of the second pendulum at London, and by this method the foot has been referred to the second pendulum just as defi-

nitely as though it were an aliquot part of the pendulum. The theoretical advantage of changing the foot to the one-third or one-fourth part of the second pendulum would in no wise compensate for the tremendous inconvenience which would result. The present relation between the foot and the ounce by which the measures of weight may be derived from the measures of length would be definitely dislocated. The proper plan, therefore, is to decimalize the foot.

Thomas Jefferson clearly perceived this, and in 1790, while Secretary of State, elaborated a plan for this purpose. Jefferson divided the foot into inches, lines, and points comparable with the division of the French pied into pouces, lignes, and points. The French division is upon the duo-decimal system, whereas Jefferson's arrangement is upon the decimal system. The bill which has been introduced is in conformity with the original conception of Watt and with the essentials of Jefferson's plan. It is entirely practical and makes no radical alterations in our present measures, but merely points the way to their improvement in a true and convenient decimal system.

The foot is the unit from which the whole system is derived. One-tenth of the foot, or the decimal inch, is the primary division in the system. The square of the decimal inch is called the decimal square, and the cube of the decimal inch is called the decimal cube. The decimal cube of water at maximum density is the ounce. The ounce is divided into 1,000 grains, or, more properly, decimal grains, and the cube or cubic foot of water at maximum density is equal to 1,000 ounces and is called the weight unit. Thirty-two of these weight units constitute one ton.

It is intended that the decimal grain will be the unit for fine weights in the mechanical and chemical sciences, the ounce the unit for retail trade weights, and the weight unit for the measure of gross weights. It is intended that the point, 1,000 of which are equal to 1 foot, and 100 of which are equal to the decimal inch, will be the unit for fine mechanical and scientific measuration, in place of the fractions of the inch, the centimeter, and the millimeter. The proposed system is entirely logical, consistent, and practical and is built upon units long sanctioned by custom and utility. It brings order into our customary system of weights and measures and is formulated for this purpose. The time has come when Congres should exercise its constitutional power to establish a uniform, rationalized system of measures and weights for the United States. The plan proposed offers the only alternative to the metric system and is superior from every point of view to the metric system for our country.

It is also intrinsically superior as the standard for a true international system of measuration.

167905—20553